

DOCUMENT RESUME

ED 113 488

CE 005 005

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TITLE Conference Report: Job Design, and Job Derived Employment Criteria. Technical Report No. 2.
INSTITUTION Akron Univ., Ohio. Dept. of Psychology.
SPONS AGENCY Office of Naval Research, Washington, D.C. Personnel and Training Research Programs Office.
REPORT NO TR-2
PUB DATE Mar 75
NOTE 18p.

EDRS PRICE MF-\$0.76 HC-\$1.58 Plus Postage
DESCRIPTORS *Employment Qualifications; *Job Analysis; *Military Service; *Research Design; Research Utilization; Task Analysis; *Technical Reports
IDENTIFIERS Job Design; Job Enrichment; Navy

ABSTRACT

The report is based on a working meeting (University of Akron, Akron, Ohio on November 13, 1974) of research contractors involved in job analyses, job design, and job derived employment criteria. The purpose of the meeting was to provide an informal exchange of research findings and designs among the participants, most of whom were engaged in research projects funded by the Office of Naval Research. The meeting included a consideration of task taxonomy, structured job analyses, task inventories, and the relevance of these methodologies to selection, training, and job design. Research results from field and experimental simulation studies were reported and discussed. A distribution list of names and addresses is included. (Author/EA)

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ED113488

TECHNICAL REPORT 2
CONFERENCE REPORT: JOB ANALYSES
JOB DESIGN, AND JOB DERIVED
EMPLOYMENT CRITERIA

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ONR CONTRACT
NONR N00014-74-a-0202-0001, NR 151-351
MARCH 1975

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1 REPORT NUMBER Technical Report No. 2	2 GOVT ACCESSION NO.	3 RECIPIENT'S CATALOG NUMBER
4 TITLE (and Subtitle) Conference Report: Job Analyses, Job Design and Job Derived Employment Criteria		5 TYPE OF REPORT & PERIOD COVERED Technical Report
7 AUTHOR(s) Gerald V. Barrett Faye H. Dambrot		6 PERFORMING ORG. REPORT NUMBER Technical Report #2
9 PERFORMING ORGANIZATION NAME AND ADDRESS Department of Psychology University of Akron Akron, Ohio 44325		8 CONTRACT OR GRANT NUMBER(s) N00014-74-A-0202-0001
10 CONTROLLING OFFICE NAME AND ADDRESS Personnel and Training Research Programs Office of Naval Research (Code 458) Arlington, VA 22217		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 61153N; RR 042-04; RR042-04-02 NR 151-351
14 MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12 REPORT DATE March 1, 1975
		13. NUMBER OF PAGES 8
		15. SECURITY CLASS. (of this report) Unclassified
16 DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18 SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Job Analyses, Job Derived Employment Criteria, Job Design, Task Taxonomy, and Job Enrichment.		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Report on a working meeting of research contractors involved in job analyses, job design and job derived employment criteria. The meeting included a consideration of task taxonomy, structured job analyses, task inventories, and the relevance of these methodologies to selection, training and job design. Research results from field and experimental simulation studies were reported and discussed.		

DD FORM 1473

EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102-014-6601

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INTRODUCTION

A working meeting of researchers in the area of job analyses, job design and job derived employment criteria was held at the University of Akron, Akron, Ohio, on November 13, 1974. The purpose of the meeting was an informal exchange of research findings and designs. Most of the participants were engaged in research projects funded by the Office of Naval Research. The meeting was chaired by Marshall Farr, Director of Personnel and Training Research Programs, Office of Naval Research.

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Proceedings (Abstracted)1. ABILITY TASK TAXONOMY

Edwin Fleishman, from the American Institutes of Research, reviewed his extensive work in Task taxonomy. This involves classifying a variety of tasks by using a dual approach: the ability requirements of a task and task characteristics independent of the operator. The research program has extended from perceptual motor tasks to cognitive tasks to real world jobs. Fleishman stated that he now has some confidence that the ability taxonomy approach may have a broader relevance than other methodologies which attempt to analyze and classify tasks. The ability taxonomy when applied to the vigilance research literature has clarified relationships and results. Early research in this area has involved the prediction of performance from ability requirements as a function of learning and skill acquisition. It was reported that at different stages of learning, various abilities increase or decrease in importance.

Current research involves the systematic manipulation of task difficulty level and perceptual complexity or configuration characteristics to discover changes in ability requirements and individual differences in performance. George Wheaton described three studies involving an auditory perception task, electronic trouble shooting task and a concept identification task. Fleishman and Wheaton concluded that since task performance becomes more specific with training there is a need for more innovative predictors of performance. In this search, emphasis should be placed on the relationships between ability characteristics and task requirements.

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2. STRUCTURED JOB ANALYSIS: POSITIONS ANALYSIS QUESTIONNAIRE (PAQ)

Ernest McCormick, of Purdue University, discussed the development, validation and applications of the Position Analysis Questionnaire (PAQ). This is a structured job analysis instrument that consists of over 180 job elements of a worker-oriented nature. Job dimensions were statistically derived from a principle components analyses of the PAQ based on 3700 jobs. The synthetic validity or what McCormick prefers to call "job component validity" was established by predicting from PAQ data, three criteria derived from the U.S. Training and Employment Service's General Aptitude Test Battery for 450 jobs. The results indicated better prediction of mean test scores than validity coefficients and better prediction of cognitive and perceptual abilities than motor or physical abilities.

Recent work involves establishing and predicting work compensation rates from PAQ data, and investigating the role of job characteristics, as measured by the PAQ as a source of variation in job satisfaction. McCormick concluded that the PAQ is an instrument which may be used to establish the aptitude requirements and compensation rates for jobs. Through this process, this instrument can eliminate the need for conventional test validation procedures and job evaluations. Instead one would proceed directly from quantitative job data to the areas of job aptitude and compensation.

3. EVALUATION OF A MARINE CORP. TASK ANALYSIS PROGRAM

C. Harold Stone, of California State University of Los Angeles, is beginning an evaluation of the Marine Corp. Task Analysis Program. This program, which has been in effect for approximately 5

years, involves teams of military analysts who prepare paper and pencil task inventories based on field observation, interviews and input of experts. The task analysis is based on the following phases (1) Study phase: review of job and training manuals, (2) Observation and interview phase, (3) Construction and preparation of task statements, (4) Processing or administration of task inventory, (5) Statistical analyses by CODAP technique to identify different jobs, (6) Preliminary report, (7) Final report which results in changes in military MOS's and changes in training. The program has resulted in cost savings in terms of training and material. C.H. Stone reported that his evaluation will encompass the following broad research questions and areas: (1) Process, methods and standardization of observation and interview techniques; (2) Method of task inventory construction including length of inventory, readability level, validity, and reliability; (3) optimal size of field sample; (4) Computer procedures and data analysis; (5) Organization of teams and personnel; (6) Relationship of peace time task analysis to war conditions; and (7) Role of worker characteristics in selection and classification.

4. A STATIC MULTI-ATTRIBUTE ASSIGNMENT (SMAAM)

Brian E. Moore, of the University of Texas at Austin, reported on the construction of a Task Inventory Index in support of a static multi-attribute assignment model (SMAAM). The model basically matches a personnel file and a job file to create the following three management reports: (1) the optimally assigned person, (2) every person by position and (3) every position by person. The

job file and personnel file are generated from the Task Inventory Index. The research sample involved a research and development organization and civil service blue collar craft jobs (e.g. electricians, welders, carpenters). The Task Inventory Index consisted of 300 task statements to which an incumbent responded with level of proficiency and the relative proportion of time spent at the stated task. The incumbent's ratings were vouchered against the superiors ratings. The task inventory was then hierarchically clustered by a CODAP program. The Task Inventory Index was used as a proficiency measure to construct the personnel file as well as the job file for SMAAM. Test-retest reliability of the inventory (4 months) was reported to average .75. The SMAAM model is not an additive but a matching model. It is based on the least deviations from goal requirements as specified by supervisors and all personnel who meet minimum requirements are included in the equation. SMAAM results in optimal selection for a given position.

5. APPLICATIONS OF JOB DERIVED EMPLOYMENT CRITERIA

Arthur Siegel, of Applied Psychological Services Incorporated, contrasted job analysis by multi-dimensional scaling and factor analysis with hierarchical cluster analysis. Siegel reported that there was good congruence across the two methods but that cluster analysis tended to over fragment and required a larger N. He then related job analysis to culture fair testing since this approach implies that tests should be based on job derived criteria. He reported on a study which involved black and white Naval enlisted men who had previously failed an entry screen test for a machinist

rating. After completion of a job analysis, these men were trained and tested in tasks which were samples of the actual machinist job. The study involved a nine-month and eighteen-month followup and the project was generally successful in selecting and placing men who had failed entry tests in higher level jobs.. Siegel discussed the concept of differential validity and the need for culture fair work and training environments as well as culture fair testing. He is currently involved in a project with private industry to identify those workers who are eligible for promotion even though previous test battery results indicate they were not qualified for promotion. Siegel concluded his presentation with a discussion of Intellectual or Mental Load Analysis. This concept is based on Guilford's Intellectual model and involves the mental strain under which men perform jobs. Siegel discussed the implications of a mental load rather than abilities approach to job design.

6. FIELD AND LABORATORY STUDIES TO INCREASE INTRINSIC MOTIVATIONAL PROPERTIES OF NAVAL JOBS

Gerald V. Barrett, of the University of Akron, presented results from field studies and laboratory simulations of Naval monitoring and maintenance tasks. The conceptual framework of the research integrates the structural characteristics of the job, the individual's perception of job structure and individual attributes including general abilities, relevant skills, personal preferences, and value orientations resulting in an optimum combination of performance, satisfaction, and retention. Results from a field study of Naval monitoring and maintenance personnel indicated

that planned Naval service or retention is related to lower general ability scores, high job satisfaction, low complexity jobs, low extraversion and field-dependence. It was concluded that those Naval personnel with the highest aptitude for the job are least satisfied with the work itself and probably will leave the Navy.

Results were reported from laboratory simulations of monitoring tasks presented under conditions of high or low job enrichment. In general, it was found that subjects of high intellectual ability and field-independent cognitive style were more effective in performance but received less satisfaction from the task.

The second laboratory simulation involved a trouble shooting maintenance task presented under two experimental instructions: high enrichment and low enrichment instruction. The results indicated that subjects wasted less time between maintenance jobs with the high enrichment instruction.

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